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STATISTICAL BULLETIN
Metropolitan Life Insurance Co.

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EIGHTEEN THOUSAND DEATHS FROM APPENDICITIS. WHY?

In the nineteen years since 1911 a steady upward trend in appendicitis mortality rates has been observed among Metropolitan policyholders. The year 1929 had one of the highest appendicitis deathrates on record. Comparing the first five with the last five years of this nineteen-year period, we find an increase of 20 per cent. in the deathrate for white males and of 14 per cent. for white females.

The increases in fatalities have varied by age. For children under five years, the appendicitis deathrate in 1925–1929 was 11.5 per 100,000 for white males, an increase of 126 per cent. since 1911–1915. For white females, the recent deathrate at this age period was 9.2 per 100,000, an increase of 92 per cent. since 1911–1915. Only between ten and nineteen years of age was there any decrease in appendicitis mortality for both males and females. Here the decrease was about 3 per cent. for white males and between 10 and 15 per cent. for white females. Beginning with adult life, however, the appendicitis deathrate showed marked increases in the period 1925–1929, as compared with 1911–1915. During adult life it was generally true that the higher the age the greater the rise in mortality. These facts are shown in the table on page 2.

In general, appendicitis mortality among males is higher than that of females. In 1911–1915, the deathrate of males exceeded that of females by 26 per cent. In 1925–1929, in view of the greater increases in mortality among males than among females, the excess in the deathrate of males had risen to 33 per cent. As measured by these data, the disease seems not to be equally common in males and females, as has been suggested in standard texts on the subject.

Much of the recorded increase in appendicitis mortality in recent years seems to be real and is not due in large part to greater precision in reporting. Beginning with 1911 great care has been exercised in

Deathrates per 100,000 from Appendicitis. Metropolitan Life Insurance Company. White Lives. Industrial Department, 1911 to 1929

Age Period	White Lives				Percentage Change 1925-1929 Since 1911-1915		Per Cent. Male of Female Rate	
	Males		Females					
	1925 to 1929	1911 to 1915	1925 to 1929	1911 to 1915	Males	Females	1925 to 1929	1911 to 1915
All Ages—One and Over.....	15.6	13.0	11.7	10.3	+ 20.0	+13.6	133	126
1 to 4.....	11.5	5.1	9.2	4.8	+125.5	+91.7	125	106
5 to 9.....	12.3	10.9	11.9	10.1	+ 12.8	+17.8	103	108
10 to 14.....	14.9	15.3	10.8	12.6	— 2.6	—14.3	138	121
15 to 19.....	17.3	17.8	11.2	12.5	— 2.8	—10.4	155	142
20 to 24.....	16.3	14.9	9.6	10.2	+ 9.4	— 5.9	170	146
25 to 34.....	15.1	13.7	9.6	10.7	+ 10.2	—10.3	157	128
35 to 44.....	17.2	12.6	12.1	8.7	+ 36.5	+39.1	142	145
45 to 54.....	20.4	11.7	15.2	11.3	+ 74.4	+34.5	134	104
55 to 64.....	21.0	13.0	17.0	9.6	+ 61.5	+77.1	124	135
65 to 74.....	22.3	13.9	16.7	10.2	+ 60.4	+63.7	134	136

securing more complete statements of the causes of death from physicians and surgeons. "Peritonitis" and other terminal conditions in appendicitis were not accepted after 1910 as reports of causes of death without qualifying and additional information on the circumstances leading to the condition. It is believed that the statistics included in this survey are as nearly complete as such data ever will be. Hence, the recorded increase in appendicitis mortality among these policyholders must reflect, by and large, a real change in the factors leading to fatal appendicitis. At the present time we do not know what those factors are.

With the statistical difficulty of incorrect reporting out of the way, we may try to account for the increased mortality. Certainly, the surgical risk has not increased for given types of cases; there has been, on the contrary, immense improvement in surgical technique since 1911. There has also been a wider appreciation on the part of general practitioners of medicine of the importance of early diagnosis and of nominally riskless operation in early cases, with an increased willingness of patients to consult physicians and to follow physicians' advice. There has occurred a wider spread of the practice of health examination, which brings to light many cases of tenderness in the region of the appendix, subject to hygienic management. In general

health examination practice, between 2 and 3 per cent. of males examined in recent years show this condition of tenderness in the region of the appendix. These known factors should have tended to improve the mortality figures.

There remain to be explained the suggested factors of: infection, directly or from foci; diet and the faddist schools in diet, perhaps the abuse of the "roughage" philosophy; habits of living; the use, abuse and self-prescription of laxative medicines and of mineral oils which may interfere with normal digestion and normal absorption. These factors may have had something to do with the increase in appendicitis mortality during recent years. The rôle of these factors, singly or in combination, has not yet been determined with definiteness.

In former years, it was assumed that high appendicitis rates prevailed in years characterized by high prevalence of general intestinal infections. The sharp fall of deathrates for diarrhea and enteritis since 1911, resulting from the protection of milk, and other food supplies, suggests, however, that food infections of the kind prevailing years ago were not a primary factor in bringing on the recent increase in appendicitis mortality.

The subject is of sufficient importance to warrant well founded and critical inquiry into the prevailing and indisputably increasing incidence of fatal appendicitis. More than 18,000 deaths from the disease occurred in the United States during 1928.

MORTALITY EXPERIENCE OF THE FIRST SIX MONTHS OF 1930

A new record for low mortality, for the first half of any year, has been registered for the winter and spring seasons of 1930. This applies to Canada as well as to the United States. In the latter, the white population has enjoyed better health than during the corresponding period of any previous year; and the deathrate of the colored people has never been so low—with a single exception. The improvement has probably extended to all ages of the population—although this cannot be stated unreservedly at this writing. It is certain, nevertheless, that the chief scourges of childhood are taking a smaller death toll than ever before; that tuberculosis, which causes death chiefly in early adult and middle life, is recording a deathrate far below the previous minimum; and that the mortality rates from several diseases, which are important factors in later life, have shown noteworthy declines in 1930.

These statements are based on the mortality experience of approximately 19,000,000 persons—the Industrial policyholders of the Metropolitan Life Insurance Company in the United States and Canada. The health records of this large cross-section of the population have invariably proved, in the past, to be accurate indices of the health conditions prevailing in the general populations of both countries.

As in 1929, a large reduction in the tuberculosis deathrate to a new minimum bids fair to be the outstanding public health fact of the year. The figure for the first half of 1930 was 85.6 deaths per 100,000 policyholders. This marks a reduction of almost 10 per cent. in a single year from the previous minimum, 95.0 per 100,000 in 1929. Both white and colored policyholders have shared in the decline, with the former showing the greater drop in the deathrate. The persistence of the strong downward tendency in tuberculosis mortality continues to support the suggestion which has repeatedly appeared in this BULLETIN, that by 1940, the tuberculosis deathrate among the American and Canadian wage-earning populations will be well on its way toward forty deaths per 100,000 population.

The improvement in the diphtheria mortality rate is an outstanding item in the health record of 1930, to date, and is second in importance to the splendid record for tuberculosis. The diphtheria deathrate has dropped approximately 27 per cent. in a single year. Unless unexpected epidemic prevalence of this disease is encountered at some time during the latter half of the year, 1930 will not only register a new minimum deathrate for diphtheria, but will mark the largest year-to-year drop ever recorded.

Still another favorable item in the 1930 health report is the record for diseases related to childbearing, which have every prospect of recording a new minimum deathrate this year.

The absence of any widespread prevalence of influenza has resulted in about the normal winter and spring deathrate for that disease. This is in marked contrast to what happened in 1929, when a major influenza epidemic exacted a large death toll during the winter. The drop in influenza mortality has been reflected in a considerable decline for pneumonia. The decreases recorded this year for heart disease and chronic nephritis are also due, in part, to the lower prevalence of influenza which, when epidemic, always hastens the deaths of many persons who suffer from chronic diseases.

In the April STATISTICAL BULLETIN we called attention to a slight decline in the cancer deathrate. This has persisted throughout the

Deathrates* per 100,000 Persons Exposed. First Six Months of 1928, 1929, 1930 Compared. By Color for Principal Causes of Death—Metropolitan Life Insurance Company, Weekly Premium Paying Industrial Business

Causes of Death	Deathrates per 100,000 Persons Exposed*					
	White			Colored		
	Jan.-June 1930	Jan.-June 1929	Jan.-June 1928	Jan.-June 1930	Jan.-June 1929	Jan.-June 1928
All Causes of Death	838.6	952.2	898.5	1514.3	1731.9	1616.9
Typhoid fever	1.1	1.4	1.7	2.5	3.5	2.7
Measles	5.0	5.0	8.7	2.6	2.0	8.1
Scarlet fever	3.7	3.8	4.0	1.0	1.1	1.7
Whooping cough	4.6	5.9	5.8	4.5	10.3	8.8
Diphtheria	7.7	10.2	12.3	3.3	6.6	6.2
Influenza	17.0	64.6	28.5	49.7	134.4	62.0
Meningococcus meningitis	3.7	5.5	2.2	11.7	9.7	2.9
Tuberculosis (all forms)	67.1	75.0	76.3	212.5	232.7	242.1
Tuberculosis of resp'y system	58.0	66.5	66.9	185.5	207.0	212.0
Tuberculosis of the meninges, etc.	4.1	3.9	4.4	6.5	4.9	8.2
Other forms of tuberculosis	5.1	4.6	5.0	20.5	20.8	22.0
Cancer	76.5	77.8	76.1	72.8	78.7	77.2
Diabetes	19.3	20.7	18.9	21.2	23.3	21.4
Alcoholism	2.9	3.2	2.8	4.8	5.7	5.3
Cerebral hemorrhage; apoplexy	53.7	55.5†	54.4†	120.1	109.9†	104.2†
Organic diseases of the heart	142.0	151.5	141.1	256.5	267.5	239.3
Total respiratory diseases	104.0	127.1	121.2	184.2	236.6	243.4
Bronchitis	3.9	4.5	4.9	4.8	6.2	7.2
Bronchopneumonia	38.2	48.6	45.2	51.7	71.7	81.8
Pneumonia (lobar and undefined)	53.7	64.8	62.2	116.7	144.6	140.9
Other dis. of resp'y system	8.2	9.1	8.9	10.9	14.2	13.4
Diarrhea and enteritis	12.4	14.2	15.9	12.8	15.6	17.4
Under 2 years	9.7	11.4	12.9	7.0	9.3	12.1
2 years and over	2.7	2.8	2.9	5.8	6.4	5.4
Acute nephritis	3.4	3.9	4.2	14.3	13.8	13.0
Chronic nephritis	62.4	67.2	67.9	131.6	133.2	136.0
Total puerperal state	12.2	13.2	13.7	18.0	22.9	21.0
Total external causes	68.9	69.9	67.1	102.1	110.9	104.8
Suicides	10.0	9.3	8.8	6.8	6.7	6.2
Homicides	3.2	2.9	2.8	27.0	30.3	30.5
Accidental and unspecified violence	55.7	57.7	55.5	68.4	73.9	68.1
Automobile accidents	18.3	17.3	15.3	17.0	16.2	16.6
All other and ill-defined causes of death	171.1	176.7	175.7	288.0	313.4	299.4

*All figures in this table include insured infants under one year of age. The figures for 1930 are subject to slight correction, as they are based on provisional estimates of lives exposed to risk.

†Rate not comparable with that for 1930.

half-year. If this improvement is maintained throughout 1930, the first break since 1924 in the upward course of the cancer mortality rate will result.

The diabetes deathrate (19.6 per 100,000) may be compared with 21.0 for the like period of 1929. There is a fair prospect that the upward course of the mortality from this disease will be checked this year, after rising continuously for five years.

Suicides have been a little more frequent than in the corresponding part of 1929, while the homicide deathrate and that for fatal accidents have dropped slightly. The mortality from automobile accidents is higher than ever before at this time of the year. Three thousand eight hundred and ninety-nine Metropolitan Industrial policyholders were killed in 1929 in motor vehicle accidents; and the estimated loss of life in the United States from this cause was 31,400. These totals will probably be exceeded this year. The only encouraging figures for automobile fatalities relate to our Canadian policyholders, whose deathrate for the half-year was 7.9 per 100,000, as compared with 8.6 for the like period of 1929. Automobile fatalities, nevertheless, have increased rapidly in Canada during recent years.

The table on page 5 presents the deathrates among white and colored policyholders respectively for the first six months of 1930, 1929 and 1928.

THE PREVALENCE OF TUBERCULOSIS IN INDUSTRY,* WITH OBSERVATIONS ON THE DUST HAZARD

The discussion of tuberculosis in industry presents two phases predicated in causal factors entirely distinct, but related and at times, overlapping. There is the prevalence of tuberculosis among industrial workers in general, which might be termed an index of their social-economic status. Then, there is the tuberculosis which is deemed to be the result of specific occupational hazard.

Considering now the first phase of our discussion, the graph on the left on page 9 illustrates the varying mortality rates for the year 1928, among three classes of the population, all white males. The insured group of Metropolitan Life Insurance Company Industrial policyholders represents the least favorable economic stratum; the Ordinary policyholders the highest; with the males in the general population of the registration states coming in between, and including both classes. The tuberculosis deathrates for males in the registration

*Digest of a paper by Dr. A. J. Lanza, Assistant Medical Director, and R. J. Vane, Statistical Bureau, Metropolitan Life Insurance Company. Read before Industrial Hygiene Conference, Chicago Tuberculosis Institute, April 25, 1930.

states are lower than those for Industrial insured males at every age period, except 65 to 74. Beginning at ages 15 to 19 years, the rate for Industrial males exceeds by 18 per cent. that for males in the registration states; and at each succeeding age period up to 45 to 54 years, the position of Industrial males becomes progressively worse. A similar situation is found when a comparison is made between the rates for males insured in the Metropolitan's Industrial and Ordinary Departments. Here, however, the Industrial group is at an even greater disadvantage, their tuberculosis deathrate in the age period, 45 to 54 years, being three and one-third times that for males in the Ordinary Department.

The wide variation in the deathrates of these classes cannot be entirely explained by differences in economic position. The effects of specific industrial hazards are unquestionably also present. The graph on the right on page 9 illustrates in a general way the relationship of industry and tuberculosis. Here we have a comparison of males and females of the same social class—Industrial policyholders. Note how unfavorable to the women is the comparison for the early age groups —the time of employment and maternity.

It is found that the tuberculosis deathrate for females from 15 to 19 is two and one-fifth times that for males; and from 20 to 24 years, it is 50 per cent. higher. Between the ages of 25 and 34, the situation changes, and thereafter the male rate exceeds the female. The maximum difference is recorded in the period 45 to 54 years, when the male rate is three and one-third times the female rate.

If now we seek to analyze the rate curve of industrial wage-workers in terms of occupation, we are faced with great difficulties. Statistics on occupational mortality are meager in the United States. One notable contribution has recently been made by twelve of the largest insurance companies.* This is an analysis of occupational mortality of white persons insured under Ordinary policies ($1,000 or more) during the years 1915–1926. The report gives, for a large number of selected occupations, the number of life years exposed grouped by age into two broad age periods, 15 to 39, and 40 years and over. The method employed is to compare the actual number of deaths from tuberculosis under each occupation with the number of deaths which would have been expected on the basis of deathrates prevailing among standard lives of the same ages.

*Actuarial Society of America and Association of Life Insurance Medical Directors, Joint Occupation Study. New York. 1929.

The occupations range between lead and zinc miners, at the top of the list, for whom tuberculosis mortality was 18 times as great as among "standard" lives, and farmers and farm laborers at the bottom, with ratios of only 80 and 65 per cent. of the "standard," respectively. Some of the occupations make a bad showing, probably because of the social-economic status of those engaged therein—laborers (298%), porters (400%), longshoremen (300%), cooks (248%) and servants (174%).

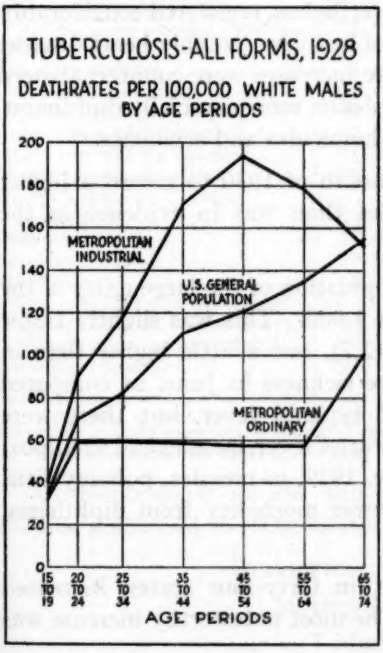
By far the most outstanding industrial hazard, the effects of which are made manifest in terms of tuberculosis, is dust. Extensive clinical evidence points to the inorganic dusts as being the worst offenders, and of these the most harmful seems to be silica dust. Free silica dust is dangerous to life, and, given sufficient exposure, the end results are practically inevitable. The exact nature of the changes which silica causes in the pulmonary tissue and its extraordinary relationship to tuberculosis are still matters for inquiry. When we know why a silica dusted lung becomes tuberculous we shall probably know a great deal more about tuberculosis than we do at present.

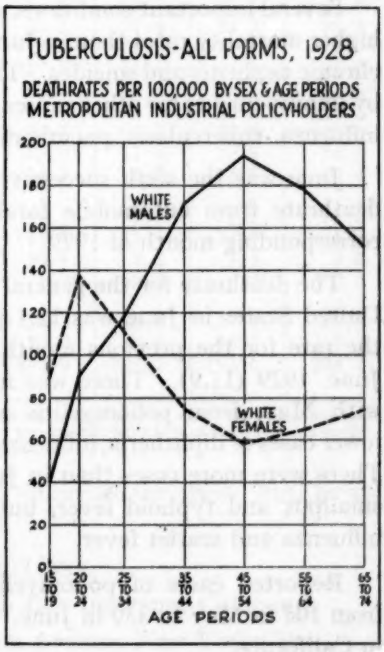
Confirmation of the clinical findings on the effects of silica dust is afforded in a general way by the insurance companies' mortality statistics to which we have referred. The occupations showing the highest ratios of actual to expected deaths were, in order—underground lead and zinc miners, granite and sandstone cutters, copper miners and gold and silver miners. All of these workers are exposed to a serious silica hazard. The ratios of actual to expected deaths from tuberculosis were, respectively, 1,800 per cent., 941 per cent., 889 per cent. and 818 per cent. There were actually 60 deaths from tuberculosis among these men as against six expected. Tuberculosis was responsible for one-half of all the deaths of lead and zinc miners, 29 per cent. of the deaths of copper miners, and 20 per cent. of those among gold and silver miners. In all of these three mining classes, deaths from tuberculosis exceeded deaths from accidental injuries. Among iron miners, who are but little exposed to silica dust, we find that the ratio of actual to expected tuberculosis deaths is only 267 per cent. The ratio among quarry workers was 259 per cent.; 7 of the deaths being due to tuberculosis where 2.7 might have been expected. It was impracticable to separate the granite quarriers from the limestone quarriers. If we had the figures, we should probably find that the excess among granite quarrymen exposed to silica was much greater than among the limestone quarrymen. This is clearly indicated by the difference in the mortality ratios for the granite and sandstone

cutters and the marble and limestone cutters. The ratio of actual to expected deaths among the former was 941 per cent., while among the latter it was but 300 per cent. There were 16 deaths from tuberculosis among the granite cutters, against 1.7 expected; whereas, there were 3 deaths in the limestone group, against one expected.

In grinding, another occupation in which there is exposure to silica dust, the ratio of actual to expected deaths was 206 per cent., and there were 7 deaths from tuberculosis, against 3.4 expected. Here again, we have a mixed hazard, for the sandstone grinders, who work in the cutlery trade, have extreme exposure to silica dust and undoubtedly suffer inordinately from tuberculosis, whereas those who work on the composition wheels do not have this exposure and probably do not have very high rates from this disease.

The only other large occupation groups suffering exposure to silica dust included in the study are certain selected foundry occupations. The interesting feature of the foundry operatives' mortality is, that, while deaths from tuberculosis were higher than expected, extreme ratios are found for influenza and pneumonia, rather than for tuberculosis. Dust is probably an important factor also in the high





non-tuberculous respiratory disease rate. Chippers of metal had very high deathrates from both influenza-pneumonia and tuberculosis. There were 8 actual deaths from tuberculosis, as against 1.3 expected; and 17 deaths from influenza and pneumonia, as against 2 expected. Molders, founders and casters had 24 actual deaths from tuberculosis, against 13.4 expected; while there were 61 deaths from influenza and pneumonia, as against 23 expected.

HEALTH RECORD FOR JUNE, 1930

The June deathrate of approximately 19,000,000 wage-earners and their families, who are Industrial policyholders of the Metropolitan Life Insurance Company, was 8.3 per 1,000. The same figure was recorded for this month in 1929, and is the lowest mortality rate for the month of June ever registered among American and Canadian wage-earners. For policyholders living west of the Rocky Mountains, the June rate was 6.8 per 1,000, as compared with 6.1 last year; in the rest of the United States, the figure was identical for each year (8.5); in Canada, this year's June rate was only 7.7 per 1,000, as compared with 8.1 in 1929.

Several important conditions, nevertheless, registered considerably higher mortality rates than in June of last year, notably heart disease, chronic nephritis and suicides. These increases were counterbalanced by improvements for other causes of death, more especially diphtheria, influenza, tuberculosis, pneumonia, homicides and accidents.

June was the sixth successive month of 1930 to record a higher deathrate from automobile fatalities than was in evidence in the corresponding month of 1929.

The deathrate for the general population of the large cities of the United States in June was 12.1 per 1,000. This was slightly below the rate for the previous month (12.7), but a little higher than in June, 1929 (11.9). There was more sickness in June, as compared with May, from poliomyelitis and typhoid fever, but there were fewer cases of diphtheria, influenza, scarlet fever, measles and smallpox. There were more cases than in June, 1929, of measles, poliomyelitis, smallpox and typhoid fever, but lower morbidity from diphtheria, influenza and scarlet fever.

Reported cases of poliomyelitis, in forty-four states, increased from 105 in May to 339 in June. The most noteworthy increase was in California.

The following table shows the mortality among Industrial policyholders for June, 1930; May, 1930, and June, 1929, together with the cumulative deathrate for the first six months of each year.

METROPOLITAN LIFE INSURANCE COMPANY

Deathrates* per 100,000 for Principal Causes, Premium-Paying Business in Industrial Department (Annual Basis)

MONTHS OF JUNE, 1930; MAY, 1930, AND OF JUNE, 1929

CAUSES OF DEATH	RATE PER 100,000 LIVES EXPOSED*				
	June, 1930	May, 1930	June, 1929	Cumulative, Jan.-June	
				1930	1929
TOTAL—ALL CAUSES	832.5	870.2	834.5	924.4	1051.2
Typhoid fever	1.9	1.2	2.4	1.3	1.7
Measles	5.5	6.0	4.9	4.7	4.6
Scarlet fever	2.1	2.6	2.2	3.4	3.5
Whooping cough	3.9	4.4	4.8	4.6	6.5
Diphtheria	3.6	5.7	7.6	7.1	9.7
Influenza	7.9	13.9	10.1	21.2	73.5
Tuberculosis (All forms)	82.8	84.5	88.7	85.6	95.0
Tuberculosis of resp'y system	71.9	73.5	77.4	74.2	84.3
Cancer	76.1	73.0	75.1	76.1	77.9
Diabetes mellitus	15.6	18.3	14.1	19.6	21.0
Cerebral hemorrhage	57.6	59.5	51.1†	62.1	62.4†
Organic diseases of heart	139.6	143.5	133.0	156.5	166.2
Pneumonia (All forms)	58.4	89.1	62.5	101.6	126.5
Other respiratory diseases	11.8	12.0	11.4	12.5	14.5
Diarrhea and enteritis	15.9	11.3	16.7	12.5	14.4
Bright's disease (Chronic nephritis)	69.9	67.5	61.4	71.2	75.6
Puerperal state	12.0	11.5	11.4	12.9	14.4
Suicides	9.9	10.1	8.2	9.6	9.0
Homicides	4.9	5.9	6.3	6.2	6.4
Other external causes (excluding suicides and homicides)	61.9	56.3	65.4	57.3	59.8
Traumatism by automobiles	20.1	19.0	19.6	18.2	17.2
All other causes	191.3	193.9	197.2	198.6	208.7

*All figures in this table include insured infants under one year of age. The rates for 1930 are subject to slight correction, as they are based on provisional estimates of lives exposed to risk.

†Rate not comparable with that for 1930.

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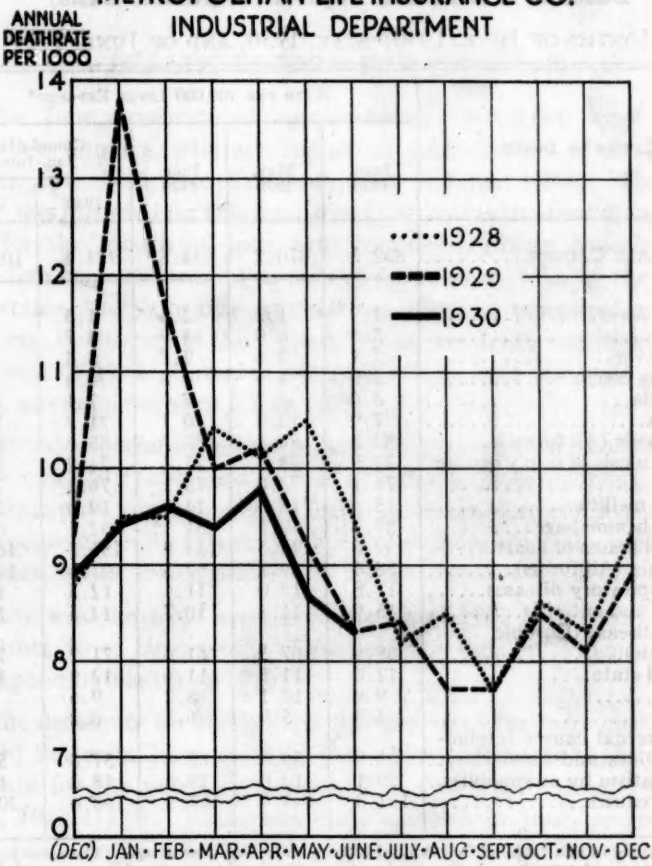

1928*	9.5	9.5	10.4	10.1	10.5	9.5	8.2	8.5	7.7	8.6	8.3	9.3
1929*	13.8	11.6	10.0	10.2	9.2	8.3	8.4	7.7	7.7	8.5	8.1	8.9
1930	9.4	9.6	9.4	9.8	8.7	8.3						

* Rates for 1928 and 1929 are final.

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